

ABSTRACT OF THE DISCLOSURE

In an electron emitter based on Metal-Insulator-Semiconductor or Metal-Insulator-Metal emitters, field emission structures are enclosed within the emitter structure. The electron emitter may include a conductive substrate and an electron supply layer formed
5 on the conductive substrate. The electron supply layer, for example undoped polysilicon, has protrusions formed on its surface. The sharpness and density of protrusions may be controlled. Above the electron supply layer and the protrusions, an insulator may be formed thereby enclosing the protrusions. A top conductive layer may be formed above the insulator. The enclosed protrusions are relatively insensitive to vacuum
10 contamination. The thinness of the insulator allows high intensity electric fields at the protrusions to be generated with low applied voltage. Field-enhanced injection of electrons into the insulator and thence through the top conductive layer results. Furthermore, electron beam dispersion and divergence are minimized.